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### **REMARKS**

#### ***Disposition of Claims***

Upon entry of the foregoing amendments, claims 1-22 will remain pending in the application and stand ready for further action on the merits. Claim 1 has been amended to clarify that the elongated body includes an end wall portion having a hemispherical exterior surface and an arcing interior surface, wherein the thickness of the end wall portion is substantially greater than the thickness of the side wall portion (chamber wall). In addition, claim 11 has been amended to clarify that the piston has a semi-circular shaped forward-facing portion that interfittingly mates with the complementary shaped interior surface of the end wall. In other words, the inner surface of the capsule's end wall is adapted to receive the piston. Thus, the piston can slide along the interior side (chamber) walls until it reaches the end wall portion. The piston and chamber sidewalls are fitted together by a close interference fit. The amendments are supported throughout the specification, particularly at page 4, paragraph 1 and page 8, paragraph 1 and by the drawings, particularly FIG. 4A and FIGS 12-14. Claim 23 has been canceled without prejudice or disclaimer of the subject matter contained therein.

#### ***Objections to the Drawings***

The Office Action first objects to the drawings under 37 CFR §1.83(a), asserting that the drawings do not show every feature of the invention specified in the claims. More particularly, Claim 23 specifies that the dental cartridge includes a "cannula," which is supported by a nozzle, and the Office Action requests that corrected drawings sheets, showing the cannula element, be submitted. Claim 23 has been canceled as noted above. Thus, this objection to the drawings should be considered moot. Applicants respectfully submit that the drawings, as filed, meet all of the requirements of 37 CFR §1.83(a) and request that this objection be withdrawn.

#### ***Objections to the Specification***

The Office Action objects to the disclosure, because of the informal term, "compules" used at page 8, paragraph 4, and requests that the term be corrected. Accordingly, the specification has been amended as note above. Particularly, the term, "compules" has been deleted and the term, "cartridge" has been substituted in place thereof.

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**Claim Rejections Under 35 U.S.C. §103**

The Office Action rejects claims 1-18 and 20-22 under 35 U.S.C. §103(a) as being unpatentable over Colin et al., U.S. Patent 5,033,650 ("Colin") in view of Bender, U.S. Patent 5,707,234 ("Bender"). It is respectfully submitted that the presently claimed invention, as recited in amended claims 1-18 and 20-22, is not prima facie obvious over the disclosures in Colin and Bender for the reasons discussed below.

Applicants agree with the Examiner that Colin generally discloses a hand-held dispensing device for inter-mixing two dental materials and dispensing the mixed product. The device includes a syringe body (12) removeably connected to a nozzle assembly (14). The head (30) of the nozzle assembly (14) includes tong-like projections (54) which fit into grooves (52) of the syringe body (12). A user presses on and twists the nozzle assembly (14) causing the tong-like projections (54) to engage end surfaces in the grooves (52), thereby inter-locking the nozzle and syringe body. The dental materials are stored in cylindrically-shaped compartments (15, 16) having discharge openings (21, 22) located at the head of the syringe. Plungers (19, 20) are used to force the materials through the discharge openings (21, 22) and into the nozzle (14). The plungers (21, 22) are equipped with pistons (17, 18) that seal the materials. As shown in FIG. 6, the head of the nozzle includes a bore (53) with a conically-shaped area (33) that extends into a cylindrically-shaped channel (34). The inside diameter of the conically-shaped area (33) in the nozzle (14) is greater than the inside diameter of discharge openings (21, 22) located at the ends of the compartments (15, 16). The Examiner asserts that the diameter of the conically-shaped area (33) is equivalent to the diameter, D2, as claimed by Applicant, and the diameter of the discharge opening (21) is equivalent to the diameter, D1. But, as the Examiner recognizes, Colin fails to disclose many of the elements recited in independent claims 1 and 11, particularly: a) an ejector-type holder and means for attaching the cartridge to the holder via an annular flange, b) a cartridge having an end wall portion with a hemispherical exterior surface and an arcing interior surface, or c) a nozzle portion, which is integrally molded to the cartridge and extends from the end wall of the cartridge at an obtuse angle.

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Turning to the disclosure in Bender, the Examiner points out that this reference discloses an ejector-type holder for supporting a cartridge or capsule (34) containing dental material. The gun-like applicator includes a plunger (18) for dispensing the material through a discharge nipple (64), which is integrally molded to the capsule (34). The body portion of the capsule (34) is cylindrical and the closed end portion (62) is preferably hemispherical. The capsule (34) includes a piston (66), which has a complementary shape to the interior shape of the capsule.

The Examiner takes the position that it would have been obvious to modify the structure of the cartridge, as described in Colin, so that it included the elements of the cartridge described in Bender. Specifically, the Examiner asserts that it would have been obvious to change the structure of the cartridge in Colin so that it included an end wall portion having a hemispherical exterior surface and an arcing interior surface as shown in Bender. Secondly, the Examiner adds that it would have been obvious to modify the cartridge in Colin so that it could be seated in an ejector-type holder (gun-like applicator) as described in Bender. Additionally, the Examiner suggests that it would have been obvious to change the position of the nozzle in Colin so that extended from the syringe body at an obtuse angle.

Applicant respectfully submits that a person of ordinary skill in the art would have no basis for combining the teachings in Colin and Bender. There must be some hint, suggestion, or motivation in the disclosures of Colin and Bender for combining these references. But, it is respectfully submitted that Colin and Bender are interested in completely different dispensing devices having entirely different operating mechanisms. Colin is not even interested in loading a dental material-containing cartridge or capsule in an ejector-type holder. Basically, Colin describes a "double barrel" dispensing syringe. Material "A" is stored in one barrel while Material "B" is stored in the other barrel. The barrels have discharge openings located at their distal ends. As the dentist depresses the plunger, Materials A and B are extruded from their respective barrels and into the dispensing nozzle. A static mixer is located within the dispensing nozzle. As Materials A and B are extruded through the static mixer, they are combined and mixed together to form a final composition. The mixed composition is dispensed from the tip of the nozzle in a measured amount.

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On the other hand, Bender describes a gun-like applicator having a compartment adapted for holding a single cartridge or capsule loaded with dental material. The applicator gun is not double-barreled. The dental material is not discharged through side-by-side exit ports located in dispensing barrels. And, a double plunger is not used to extrude the material. Rather, a single capsule containing dental material is placed in the applicator gun. The material is forced through the nipple of the capsule by an actuator lever pivotally connected to a handle member. To advance the plunger and eject material from the capsule, the dentist presses on the operating lever. This causes the operating lever to swing about its pivot point and move toward the handle member. The inside surface of the operating lever engages the plunger, thereby causing the plunger to advance forward and eject material through the nipple of the capsule. Thus, the applicator gun operates in a completely differently manner than the double barrel dispensing syringe.

A person of ordinary skill in the art would have no reason to modify the Colin double barrel dispensing device so that it could be placed in a Bender gun-like applicator. Modifying the double barrel syringe in such a way would destroy how the device basically functions. As discussed above, the Colin dispensing device does not include a cartridge or capsule loaded with dental material. Replacing the double barrels in the Colin device with a cartridge having a hemispherical exterior surface and curved interior surface along with an angled nozzle would be a substantial reconstruction of the device. This redesign would completely change how the Colin dispensing device operates. The essence of the "invention" described in Colin would be destroyed. It is respectfully submitted that making such a modification to the Colin dispensing device is not proper. Thus, the presently claimed invention should not be held prima facie obvious in view of the disclosures in Colin and Bender.

Even if the disclosures in Bender and Colin could be combined together properly, it is respectfully submitted the presently claimed invention still would not be obvious. As recited in amended claims 1 and 11, the end wall portion of the elongated capsule-like cartridge is of substantially greater thickness than the inner chamber wall of the cartridge. Referring to FIGS. 3, 4, and 6, it can be seen that the thickness of the end wall (54) is substantially greater than the thickness of the cylindrical body wall (48). Preferably, the thickness of the end wall (54) is at

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least 20% greater than the thickness of the cylindrical body wall (48) as discussed at page 4 of the specification. One advantage of the dispensing device of present invention is that the force needed to extrude dental material from the device is less than the force needed for conventional dispensing devices. The reduction in extrusion force is in the order of about 20 to about 30 percent. It is believed that this improvement in extrusion force is partly owed to the structure of the cartridge. In contrast to Applicant's device, the cylindrical wall of the cartridge in Bender is of uniform thickness. This feature is explicitly recited in claim 1 of Bender.

1. A miniature capsule-like cartridge, comprising:

a hollow elongated uniformly cylindrical body of predetermined length and uniform diameter interiorly and exteriorly and molded from rigid plastic material, one end of said body being open and formed at the extremity thereof with an annular relatively short circular exterior flange of limited width and adapted to be detachably mounted within a complementary seat in an ejector type holder, the opposite end of said body being closed by a wall of substantially the same uniform thickness as said body. . . . (Col 7, lines 5-17, emphasis added.)

Bender provides no hint or suggestion for a cartridge having an end wall portion with a substantially greater thickness than the thickness of the cylindrical side wall. In view of the foregoing, it is respectfully requested that the rejection of claims 1-18 and 20-22 over Colin et al., U.S. Patent 5,033,650 ("Colin") in view of Bender, U.S. Patent 5,707,234 ("Bender") under 35 U.S.C. §103(a) be withdrawn.

The Office Action next rejects claim 23 under 35 U.S.C. §103(a) as being unpatentable over Colin et al., U.S. Patent 5,033,650 ("Colin") in view of Bender, U.S. Patent 5,707,234 ("Bender"), as applied to claims 1-18 and 20-22 above, and further in view of Evers et al., U.S. Patent 6,503,084 ("Evers").

As discussed above, claim 23 has been canceled so it is respectfully requested that this rejection be withdrawn. Addressing the Evers patent for the sake of making a complete response, this reference is directed to dental cartridges filled with high viscosity dental material. The cartridge has a generally cylindrical structure. A piston, which is adapted for sliding along the inner walls of the cartridge chamber, is used to force the dental material through a discharge nozzle. As the

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Examiner points out, the nozzle is outfitted with a needle cannula providing direct and precise application of the dental material to the tooth. As the piston is manually pressed into the cartridge chamber to extrude the dental material, air passes from the chamber and through a grooved channel. Venting air from the chamber prevents pressure build-up within the reservoir portion of the chamber and allows for better control of the extrusion process. There is no disclosure or suggestion of the presently claimed invention in Evers.

Lastly, the Office Action rejects claims 19 and 22 under 35 U.S.C. §103(a) as being unpatentable over Guillot, FR 2,501,080 ("Guillot") in view of Bender, U.S. Patent 5,707,234 ("Bender").

The Guillot reference is a French patent. An English-translated copy of the Guillot reference has been attached hereto for convenience of the Examiner. Basically, Guillot discloses a gun-like applicator for mixing two components of a material together and ejecting the mixed material. The applicator can be used for dispensing mixed materials such as mastic pastes, glues, or grease. The ejector-type holder in Guillot supports two cartridges, each cartridge containing one component of the material. Referring to FIGS. 1 and 2, the device includes a cylindrical inner cartridge (10) that stores the first component and a coaxial outer cartridge (16). The second component is stored in a tubular chamber (38) disposed between the inner and outer cartridges (10, 16). The inner cartridge is provided with a nozzle (14) and the coaxial tubular chamber (38) also includes a nozzle. A central piston (39) forces the first material to be extruded from the inner cartridge (10) and an annular piston (41) forces the second material from the coaxial tubular chamber (38). The first and second materials are forced respectively into a tubular injector (40), containing a static mixer (42), where the materials are combined and mixed together. The mixed material is then dispensed through the tip of the tubular injector (42).

In essence, Guillot describes a gun-like ejector or applicator for housing two cartridges, each cartridge storing a different material, with two separate pistons and nozzles for feeding the material into a tubular injector (third nozzle). Applicant's device, as opposed to the device described in Guillot, contains only capsule, one piston, and one discharge nozzle. There is no disclosure or suggestion for the presently claimed invention in Guillot. Thus, it is respectfully submitted that

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even if the teachings in Guillot were combined with the teachings in Bender, which is discussed above, the present invention would not be obvious. It is respectfully requested that the rejection of claims 19 and 22 over Guillot, FR 2501080 ("Guillot") in view of Bender, U.S. Patent 5,707,234 ("Bender") be withdrawn.

*Conclusion*

In summary, Applicant submits that claims 1-23 as amended are patentable and each of the Examiner's rejections and objections has been overcome. Accordingly, Applicant requests favorable consideration and allowance of amended claims 1-23.

The Commissioner is hereby authorized to charge any additional fee required in connection with the filing of this paper or credit any overpayment to Deposit Account No. 04-0780. Should there be any outstanding matter that needs to be resolved in the present application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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Date: APRIL 5, 2006

Attachments: Petition for Extension of Time  
English translation of FR Patent 2,501,080 (Guillot)

REPUBLIC OF FRANCE (11) Publication No.: **2,501,080**  
(To be used only for ordering  
NATIONAL INSTITUTE copies)  
OF INDUSTRIAL PROPERTY  
PARIS

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**APPLICATION  
FOR PATENT OF INVENTION**

(21) No. **81 04213**

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(54) DEVICE FOR APPLICATION OF A MIXTURE OF AT LEAST TWO  
LIQUID OR PASTE COMPONENTS

(51) International Classification (Int. Cl.<sup>8</sup>): B 05 C 9/06

(22) Date filed: March 3, 1981

(33)(32)(31) Priority claimed:

(41) Date the application was laid open to public inspection: BOPI "Lists" No.  
36 of 9/10/1982

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(72) Invention of: Claude Guillot

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The present invention concerns a device designed for the simultaneous application, extrusion or injection of liquid or paste components, such as glues, mastics or grease.

Devices of this type are known in which the components are packaged in cartridges positioned side-by-side and whose outlets are joined together in a Y nozzle wherein the components are mixed to form a homogeneous product.

In other known devices, the components are packaged in coaxial cartridges whose outlets are radially offset relative to one another. Such cartridges are not commercially available and they must be specially manufactured for this application. Moreover, at the outlet of the cartridges, the components follow different trajectories and begin to be mixed only in the central branch of the Y nozzle. Such a nozzle therefore assures only an imperfect mixing and has a large portion of its length that is not involved in the mixing operation.

The present invention proposes a device for the application of at least two components, which uses simple cartridges, of current form, and which assures a good mixing of the components right from the outlet of the cartridges. For this purpose, the invention concerns a device of the type comprising at least two coaxial cartridges each filled with one of the components, open at one end and closed at the other end by a bottom provided with a central outlet nozzle, a central piston, and an annular piston mounted in a sliding manner sealed respectively on the inside of the inner cartridge and the tubular chamber defined between the two cartridges, and a drive mechanism for said pistons, a device

characterized in that the outlet nozzle of the outer cartridge is of larger diameter and coaxial to that of the inner cartridge, a hollow spacer element being provided to create a radial trajectory between the two cartridge bottoms connecting said tubular chamber and the outlet nozzle of the outer cartridge.

Such cartridges have the advantage of being available commercially. Moreover, they permit the components to be mixed as soon as they leave the nozzles.

According to one particular embodiment of the invention, said drive mechanism comprises a first shaft terminated on one end by a push-rod designed to press against the central piston of the inner cartridge, at least two second shafts parallel to each other and attached by one end to two diametrically opposed points of an annular push-rod designed to press against the annular piston of the outer cartridge, said first and second shafts being connected together on their other ends by a joining cross-piece, and a trigger acting on one of said shafts so as to move the two-piston assembly forward each time that the trigger is pressed.

One embodiment of the invention will be described presently with regard to the attached drawings in which:

Figure 1 is a perspective view, partially cut away, of the device according to one embodiment of the invention;

Figure 2 is a partial axial sectional view of the device of Figure 1;

Figure 3 is an exploded perspective view of the inner and outer cartridges;

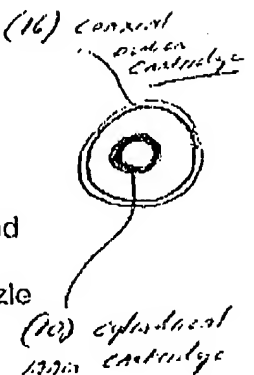
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Figure 4 is a view of the static mixer of Figure 2 envisioned on a plane;  
and

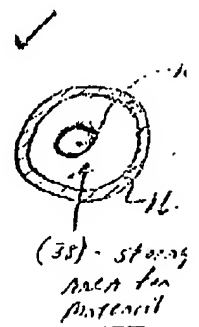
Figure 5 is a sectional view along line V-V of Figure 2.

The following description will be made for the case of mixing two components, but it is obvious that the principle of the application applies equally well to the case of mixing more than two components.

With reference to Figures 1 and 2, the device according to the invention comprises a cylindrical inner cartridge 10 open at one end and closed at the other end by a bottom 12 provided with an outlet opening in the shape of a nozzle 14 and a coaxial outer cartridge 16 of diameter greater than that of cartridge 10, open at one end and closed at the other end by a bottom 18, and provided with an opening in the form of a nozzle 20, coaxial to the outlet nozzle 14.



The cartridges are designed to receive liquid or paste components, for example mastics, glues or grease, designed to react with each other right at the time of application. A first component fills all of the inner volume of cartridge 10, while a second component fills tubular chamber 38 created between cartridges 10 and 16. Of course, the hollow space 24 can have any other form, for example a spiral form, which permits the components contained in chamber 38 to flow towards nozzle 20. A central piston 39 and an annular piston 41 are fitted into cartridges 10 and 16 in a sealed manner.



A flat circular flange 22 of diameter equal to the inner diameter of cartridge 16, is set around nozzle 14 by any appropriate means, so that its peripheral part

projects beyond the outer wall of cartridge 10. This projecting part notably serves to maintain the coaxial state between the cartridges at the end of the outlet. Flange 22 has an elongated hollow space 24 on its outer face that involves only a fraction of its thickness. As Figures 2 and 3 show, this hollow space has two radial portions 26, 28 emerging near the periphery of the flange and connected tangentially to a circular part 30 situated around the center of flange 22. At the ends of the radial recesses, two holes 32, 34 are drilled on either side of the flange. Flange 22 has an opening in its center that nozzle 14 of the central cartridge passes through.

A tubular injector 40 is fitted onto nozzle 20 in which a static mixer 42 is housed, made up of a cylindrical piece provided with a left-handed thread and a right-handed thread. In the example illustrated in Figures 2, 4 and 5, the mixer has three left-handed threads and three right-handed threads, but it could have a number larger than three. Grooves 41, 43 created between the threads cross several times, so that the components leaving by nozzles 14 and 20 undergo an energetic agitation at different groove intersections 45 and so that a homogeneous mixture of the two components is obtained at the outlet of the mixer.

*Known way  
and other  
nozzles feed  
material into  
injection tube  
(40)  
containing  
static mixer.*

The length of the mixer and the number of threads will be calculated as a function of the viscosity of the components. Several mixers can be used by positioning them end to end, possibly with partitions separating them.

Figure 1 shows a particular embodiment of a gun designed to eject said mixture. A detailed description of the feed mechanism of this gun is found in

French Patent Application No. 79-07,311 in the name of the Applicant. In the following, we will only describe in detail the novel elements of the gun.

The gun comprises a tube 44 designed to receive cartridges 10, 16. The tube is closed at its front end by a removable cover 46 and its rear end is screwed into a cup piece 48, on the bottom of which a handle 50 in the shape of a stirrup is attached by soldering, for example,. A shaft with rack 52 oriented along the axis of tube 44 passes with play through a hole 54, drilled in the center of the bottom of cup piece 48 and a hole 56 drilled into the core of the handle and aligned with hole 54. Shaft 52 has a central push-rod 58 at its end inside the tube, designed to press against central piston 39.

The bottom of the cup piece is drilled with two other openings to which tubular sleeves 60, 62 are fitted. Two shafts 64, 66 are mounted in these sleeves in a sliding manner parallel to rack 52. The ends of shafts 64, 66 inside tube 44 are attached at two diametrically opposite points of an annular push-rod 68 designed to press against annular piston 41.

Shafts 64, 66 and rack 52 are connected in translation by means of a cross-piece 70 connecting their outer ends to tube 44. The rack passes with play through a transverse hole 72, drilled through cross-piece 70 and bearing two rings 74, 75 on either side of said hole, which prevent the sliding of the rack alone, but allow the rotation of the rack around its shaft. At its free end, the rack has a handle 76 by which it can be turned.

The two push-rods 58, 68 can be driven by means of a mechanism known in and of itself, comprising a triggering mechanism 78, a feed pawl and an anti-return pawl, not shown, cooperating with the gearing of the rack.

According to this embodiment, the device is mounted as follows:

Rack 52 is rotated by a half-turn relative to the position that it has in Figure 1, so as to release the pawls from the rack gearing, then the mobile assembly comprising rack 52 and shafts 64, 66 is pulled to the bottom toward the right. Cover 46 is removed and then new coaxial cartridges 10, 16 are introduced into tube 44. Injector 40 is fitted onto nozzle 20 of cartridge 16, equipped with its static mixer, and then the tube is closed with its cover 46. The cartridges are then firmly held against any movement and the device is ready to be used.

Each time the triggering mechanism is activated, push-rods 58, 68 move forward along a predetermined course, expelling doses of components through nozzles 14 and 20, and these doses are then mixed in static mixer 42.

Advantageously, handle 50 and triggering mechanism 78 of the gun are coupled without discontinuity by rounded parts 80, 82, so that there is no risk of pinching the hand when pulling the triggering mechanism.

The cartridges can be replaced either from the front of tube 44, after removal of cover 46, or from the rear after unscrewing tube 44.

The gun that has just been described uses a pawl and rack feed mechanism, but any friction feed mechanism known in and of itself can also be used.

The volume quantities of the components in the mixture are obviously respectively proportional to the sections of cartridge 10 and annular chamber 38. For example, in order to obtain a mixture of equal volumes, cartridges 10 and 16 are chosen with respective inner diameters  $d$  and  $D$  such that:  $D^2 = d^2 + (d + 2e)^2$ ,  $e$  being the thickness of the inner cartridge.

As is known, when two components of different viscosities flow through the same conduit, the more viscous component has a natural tendency to circulate at the center of the conduit, while the less viscous component flows against the walls of the conduit. By packaging the more viscous component in cartridge 16 of greater diameter and the less viscous component in cartridge 10 of smaller diameter, an arrangement of components in injector 40 is established that is the reverse of the natural arrangement. Given that the components have a tendency to return to their natural arrangement, a premixing is produced before the components pass into the static mixer. It will be noted that such a mixture cannot be produced in the known devices mentioned previously, comprising nozzle outlets offset axially.

Advantageously, anti-return valves could be provided at the outlet of nozzles 14 and 20 which open when the components are extruded, but which close the nozzles when a partial vacuum is created in the cartridges, for example, when the mobile assembly is drawn back. Thus the components found in injector 40, which have already undergone a pre-mixing or even a mixing, are prevented from being aspirated into the cartridges.

## CLAIMS

1. A device for application of a mixture of at least two liquid or paste components, of the type comprising at least two coaxial cartridges each filled with one of the components, open at one end and closed at the other end by a bottom provided with a central outlet nozzle, a central piston and an annular piston mounted in a sliding manner respectively sealed inside the inner cartridge and at the tubular chamber defined between the two cartridges, and a drive mechanism for said pistons, characterized in that outlet nozzle 20 of outer cartridge 16 is of larger diameter and coaxial to nozzle 14 of inner cartridge 10, a hollow spacer element 22 being provided to create a radial trajectory 26, 28 between the two bottoms 12, 18 of the cartridges, connecting said tubular chamber 38 and outlet nozzle 20 of the outer cartridge.
2. The device according to claim 1, further characterized in that said hollow spacer element consists of a flat flange 22 of section roughly equal to the inner section of outer cartridge 16 and having an opening in its center for the passage of outlet nozzle 14 of the inner cartridge, said spacer element comprising, on its face turned toward bottom 18 of outer cartridge 16, a central recess 30 surrounding nozzle 14 and connected, by a channel drilled in the thickness of the flange to at least one opening of the flange opening into tubular chamber 38 comprised between cartridges 10 and 16.



3. The device according to claim 2, further characterized in that the channel or channels 26, 28 are tangentially coupled to central recess 30.
4. The device according to either one of claims 2 and 3, further characterized in that channels 26, 28 are formed on the face of the flange that is turned toward bottom 18 of the outer cartridge and their depth only involves a part of the thickness of said flange 22.
5. The device according to one of the preceding claims, further characterized in that flange 22 is fitted by any appropriate means onto nozzle 14 of inner cartridge 10, for example by press fitting, screwing, or gluing.
6. The device according to claim 1, further characterized in that said drive mechanism comprises a first shaft 52 bearing a push-rod 58 at one end designed to press on central piston 39, at least two second shafts 64, 66 parallel to the first shaft, and attached by one end to two diametrically opposed points of an annular push-rod 68, designed to press against annular piston 41, said first and second shafts being connected together by their other end by a joining cross-piece 70, the mobile assembly made up of the push-rod and the shafts being driven toward the front by a triggering mechanism 78 of a gun, which cooperates with one of said shafts, anti-return means being provided to oppose the recoil of the mobile assembly when the triggering mechanism is released.
7. The device according to one of the preceding claims, further characterized in that the gun is of the rack type, the rack gearing being created on shaft

52 bearing central push-rod 58, and in that this shaft is connected in translation with joining cross-piece 70, but can rotate relative to it.

8. The device according to claim 7, further characterized in that shaft 52 bearing the central push-rod passes with play through a hole 72 drilled through said joining cross-piece 70 and bears two rings 74, 75 set on either side of said hole, which oppose translational movement of the shaft bearing the central push-rod.
9. The device according to claim 8, further characterized in that shaft 52 bearing the central push-rod is terminated by a handle part 76 by means of which one can pivot said shaft to disconnect the pawls.
10. The device according to one of claims 1 to 6, further characterized in that the gun is of the friction type, comprising a triggering mechanism that activates at least one first friction plate threaded around the shaft bearing the central push-rod, so as to move the mobile assembly forward, and a second friction plate also threaded around said shaft and opposing the recoil of the mobile assembly.
11. The device according to one of claims 6 to 10, further characterized in that handle 50 and triggering mechanism 78 of the gun are coupled without discontinuity by rounded parts 80, 82.
12. The device according to one of the preceding claims, further characterized in that it comprises a static mixer housed in a tubular injector 40 which is

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fit around outlet nozzle 20 of outer cartridge 16, said static mixer being made up of a cylindrical part 42 provided with a left-handed thread and a right-handed thread, so that grooves 41, 43 comprised between the threads cross several times and at the intersections 45, the components leaving the cartridges undergo energetic mixing.

13. The device according to one of the preceding claims, further characterized in that anti-return valves may be mounted in outlet nozzles 14 and 20 in order to prevent the re-aspiration of components found in injector 40 toward cartridges 10, 16.

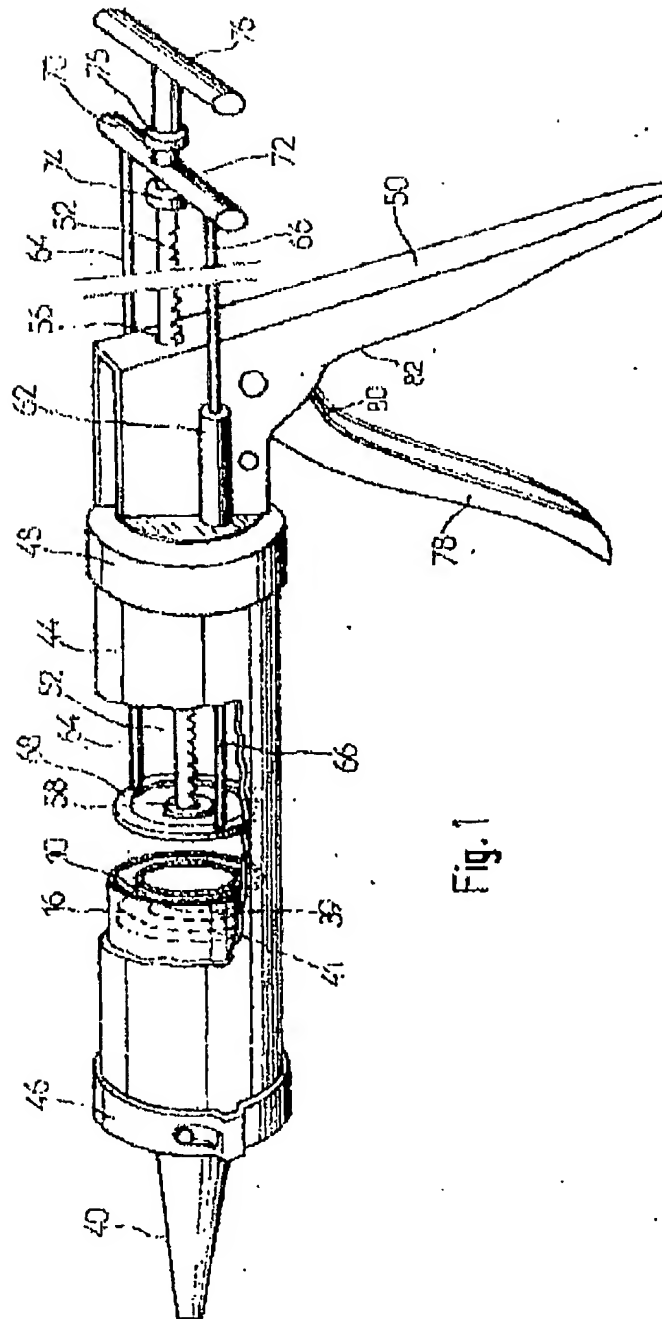
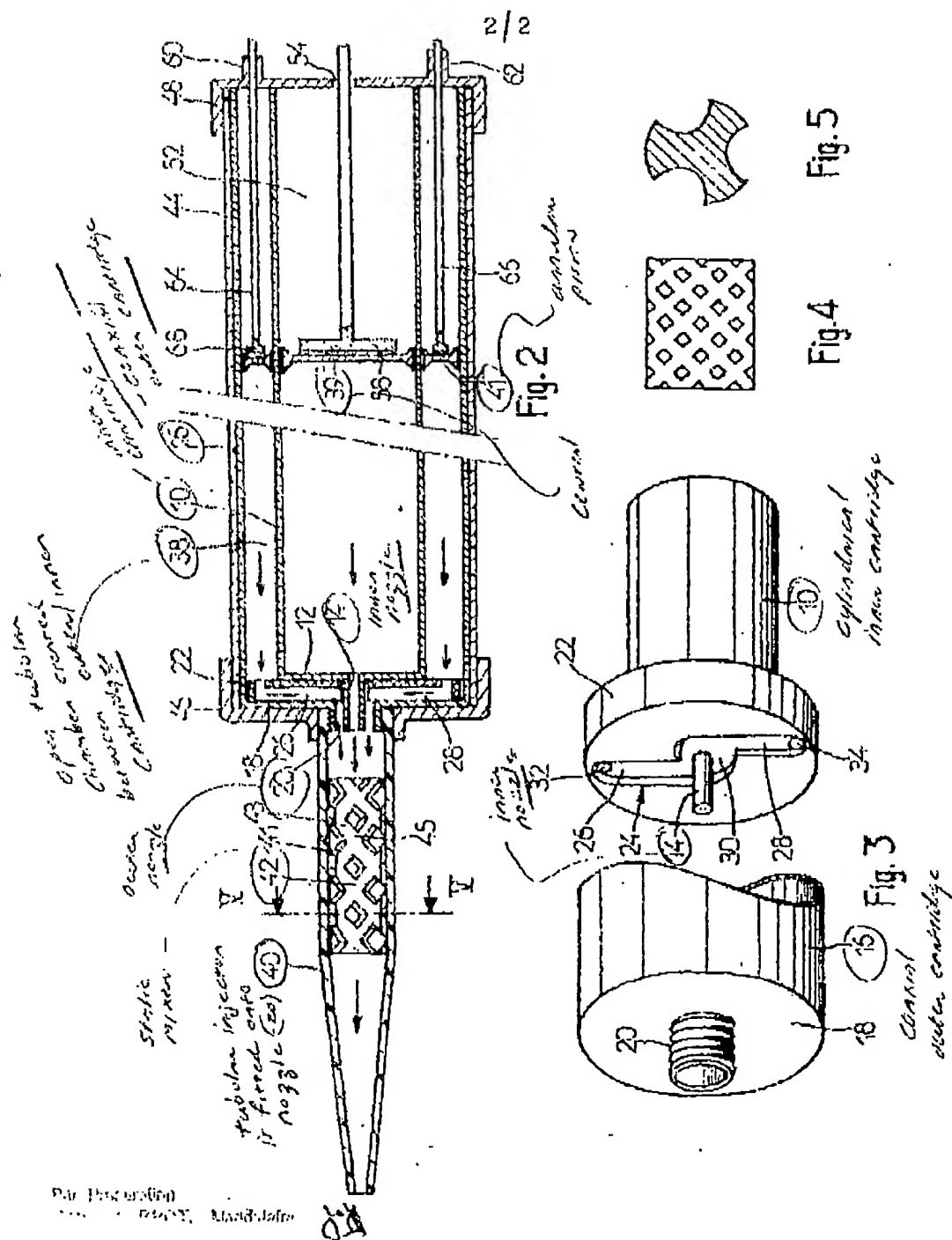


Fig. 1

For Protection  
Patent Office, Washington

By agent (power of attorney)  
RHOT Offices, Authorized Agent



By agent (power of attorney)  
BROT Offices, Authorized Agent